

Nanostructured Interfaces in Polymer Based Solar Cells

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Polymer based solar cells offer tremendous potential for next generation thin film, low cost energy conversion. To increase efficiency above the current 2-4 understanding of the excitonic transport in the films and the nature of the decomposition of excitons to charge carriers at interfaces and the subsequent transport of the charge carriers. We will discuss recent results employing the deposition of MEH-PPV and cyano-PPV on nanostructured TiO₂ to explore this area.

Particularly critical is the key issue of whether the interfacial properties dominate the overall device kinetics or whether the exciton diffusion length is the dominant factor. Overall device design depends critically on which is the dominant factor. We report results on controlling the nature of the nanostructured interface and the electron affinity of the polymer to address this issue. Direct transport and optical measurements have been used to explore the excitonic lifetimes and transport. We will discuss the implications of the results to minority and majority carrier devices, such as OLED and PV.